

SUPPORT FOR THE AMENDMENT

Support for the amendment to claim 1 is found in claims 12 and 13 as originally presented. No new matter would be added to this application by entry of this amendment.

Upon entry of applicants' amendment, claims 1-11 and 13-17 will now be active in this application.

REQUEST FOR RECONSIDERATION

The claimed invention is directed to a process for preparing prepolymers containing isocyanate groups.

Prepolymer preparation having a low degree of polymerization and a narrow molecular weight distribution as well as a low content of monomeric diisocyanate are sought after as providing more uniform properties for a polyurethane. While the product distribution may be adjusted by changing the stoichiometric ratio of reactants, the result is typically a large molar excess of diisocyanate which must be removed, introducing additional complexity and costs and sometimes resulting in undesirable residual diisocyanate content. While unsymmetrical diisocyanates have been used in the preparation of isocyanate prepolymers having a low degree of polymerization and a narrow molecular weight distribution, such processes have not provided entirely satisfactory results such that further methods for producing isocyanate prepolymers are sought.

The claimed invention addresses the problem by providing a process for preparing isocyanate prepolymers comprising reacting unsymmetrical diisocyanate with an isocyanate reactive compound in the presence of an organometallic catalyst, followed by removal of excess monomeric diisocyanate, wherein the organometallic catalyst is either removed, blocked or deactivated before removal of monomeric diisocyanate by treatment with specific blocking or deactivating compounds. Applicants have discovered that removing catalytic activity of the organometallic catalyst **before** separation of the monomeric diisocyanate provides for an efficient process for preparing isocyanate prepolymers of a low degree of polymerization and narrow molecular weight distribution. Such a process is nowhere disclosed or suggested in the cited art of record.

The rejections of claims 1-11 under 35 U.S.C. § 103(a) over Narayan (U.S.4,544,763) as evidenced by Narayan U.S. 4,228,095 in view of Hippold et al. (U.S. 2003/0162933), of

claims 12-15 and 17 under 35 U.S.C. §103(a) in further view of Duffy et al. (U.S. 5,382,602) and of claim 16 under 35 U.S.C. §103(a) in further view of Marans et al. (U.S. 4,061,662) are respectfully traversed.

None of the cited art of record discloses or suggests catalyst removal, blocking or deactivation in which blocking or deactivation is achieved with compounds as claimed.

Narayan '763 describes the removal of free TDI monomer (<1%) by complete reaction with MDI which results in a higher viscosity. No removal of diisocyanate monomers, and in particular MDI is disclosed. Moreover, there is no disclosure of a minimal content of MDI in the prepolymer and accordingly the reference has nothing to do with the claimed invention.

While examples 3-6 in column 4 are cited for the addition of benzoyl chloride, applicants note that, in general, benzoyl chloride is used during the synthesis of isocyanate prepolymers **to prevent side reactions** by means of keeping the whole reaction mixture in the **weak acid range**. In this instance, benzoyl chloride is not subject to function as an isocyanate catalyst deactivator.

Page 3 of the official action cites to Narayan '095 for a disclosure of using benzoyl chlorides and other compounds to deactivate an organotin compound catalyst.

Applicants note that the reaction being catalyzed in Narayan '095 is the **formation of carbodiimide groups** in an existing organic polyisocyanate. The reaction is conducted by heating an organic polyisocyanate in the presence of a catalytically sufficient amount of a **carbodiimide-forming catalyst** that is an organotin compound at temperatures of 200°C and greater (column 1, lines 47-51). Thus, while the catalytic activity of an organotin compound toward the **formation of carbodiimide groups** in a polyisocyanate may be inhibited by addition of benzoyl chloride and other compounds, the inhibition of a polyurethane forming catalyst toward the **formation of polyurethanes** by addition of benzoyl chloride not been

suggested. Narayan '095 fails to disclose or suggest deactivation of an isocyanate forming organometallic catalyst.

In contrast, the claimed invention is directed to an isocyanate containing prepolymer forming reaction in which a diisocyanate and isocyanate reactive compound are reacted in the presence of specific organometallic catalysts which facilitate **the reaction of diisocyanate** with isocyanate reactive compound, the catalyst being removed, blocked or deactivated prior to separation of monomeric diisocyanate. Applicants note that the claims have been amended to recite the use of specific organometallic catalyst blocking or deactivating compounds.

As neither Narayan '763 nor Narayan '095 suggest deactivation of an isocyanate forming organometallic catalyst, the claimed invention directed to the use of specific isocyanate forming organometallic catalyst blocking or deactivating agents is not obvious. How can it be obvious to use the claimed isocyanate forming catalyst deactivators, when neither Narayan reference suggests deactivation of an isocyanate forming catalyst?

Hippold et al. merely has been cited for reduction of diisocyanate monomer by distillation but fails to disclose the use of a catalyst and accordingly cannot suggest blocking or deactivation of catalysts with the claimed compounds prior to removal of excess diisocyanate.

Duffy et al. has been cited for disclosure that storage stability of a **polyurethane** may be enhanced by catalyst deactivation performed at the end of polymerization to help prevent decomposition of the polyurethane foam (column 4, lines 38-42). There is no step of removing diisocyanate monomer from the polyurethane foam so there can be no suggestion of removing catalyst activity prior to removal of diisocyanate monomer from prepolymer. Further, since there is no disclosure or suggestion of use of a catalyst in the preparation of prepolymer there can be no disclose or suggest of removal, blocking or deactivation of catalyst prior to removal of monomeric diisocyanate.

Marans et al. has merely been cited to explain the reactivity patterns of aromatic diisocyanates, but fails to disclose or suggest the claim limitation of isocyanate organometallic catalyst deactivation with specific compounds.

Thus, the disclosures relied upon by the examiner fail to disclose or suggest a method in which organometallic catalyst is removed, blocked or deactivated with specific compounds, prior to removal of monomeric diisocyanate.

Since there is no disclosure or suggestion of removal of catalyst activity with specific isocyanate catalyst deactivators prior to removal of monomeric diisocyanate, the claimed invention is clearly not rendered obvious by the references and accordingly withdrawal of the rejections under 35 U.S.C. § 103(a) is respectfully requested.

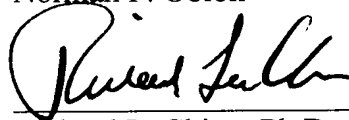
Applicants submit that this application is now in condition for allowance and early notification of such action is earnestly solicited.

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 08/07)

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



Richard L. Chinn, Ph.D.
Registration No. 34,305